

# Bump Bonding and Thinning of Hybrid Pixel Detectors

- Bump bonding with fine pitch and matching small bumps is an advanced technology, available to customers from only a rather small number of specialized vendors worldwide. The offered processes are distinguished by many parameters - the most important ones are the bond medium used (solder or indium), and the maximum wafer size and minimum wafer thickness that can be handled.
- At CERN, bump bonding for the ALICE and LHCb experiments (including an application in NA60) is performed at VTT, Finland, which uses solder bumps of 20  $\mu\text{m}$  diameter at 50  $\mu\text{m}$  pitch. During the presently ongoing R&D phase, high-quality single-chip detector assemblies and multi-chip ladder assemblies were obtained from the initial processing of  $\frac{1}{4}$  wafers, and recently also some from a first processing of full-size wafers of 8" diameter.
- The currently available assemblies are not thinned yet. The prospects are to arrive at the bump bonding of readout chips, thinned to around 150  $\mu\text{m}$ , to detectors of 200  $\mu\text{m}$  thickness.
- Parallel to the detector thinning, low-mass chip busses and mechanical supports are required to make visible in the material budget the material saved in the detector thinning.
- PHENIX is in the process of negotiating access to this pixel detector technology at CERN via an effort of RIKEN.